Development of Low-Cost Conformable Storage to Maximize LPG Vehicle Range

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4/95–4/97

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Objective

To develop and demonstrate the feasibility of a low-cost, injection-molded, conformable (noncylindrical) storage system for propane.

Prototype metal version of conformable propane tank

Approach

Thiokol Corporation will design, fabricate, and test a prototype injection-molded, conformable propane tank. The space efficient shape of the tank stores 40% more fuel in the same storage envelope than cylinders. Thiokol has proven the shape concept and is in production with a metal version of the tank. This program will develop the design, materials, and processing technology to use engineering thermoplastic materials and injection-molding processes. The resulting tank is projected to cost 40%–60% less than the welded metal structure currently used. Key technical challenges include meeting the burst, fatigue, creep, damage tolerance, and environmental tolerance requirements. Ten tanks will be fabricated and testing conducted to demonstrate performance.

Accomplishments

Thiokol has completed a preliminary design of the tank. Tooling designs are in process. Material trade studies are being conducted to screen materials and then gather properties data on the remaining candidates. Small cylindrical pressure vessels are being fabricated as test specimens to quantify the pressure vessel performance of the materials and performance of fittings molded in place. The small vessels will be burst tested and the data used for the final tank design.

Future Direction

Work will continue on developing the tooling and the process for fabricating the tanks. Concepts will be tested on the small diameter cylindrical test specimens. We expect to mold the first conformable tank in Fall 1995.

Successful completion of this project will lead to commercialization of this technology for LPG vehicles and could lead to spinoffs in other areas including recreational vehicles that use LPG.

Publications

None to date.